

*a, incl'd.*

short. In the motor, external electric power is supplied to the rotor, for rotation thereof, through a commutator provided on the rotor and a brush that slides over the commutator. The determining means determines shorting by comparing the detected current or voltage with a pre-stored current or voltage supplied from the power source. As such, the detecting means detects the current or the voltage supplied to the motor from the power source, and the determining means determines a short of at least one of the coils by comparing the detected voltage or current and the pre-stored voltage or current supplied from the power source during normal operation. Therefore, one detecting means is provided. Furthermore, since shorting is determined based on the current or voltage varied due to motor rotation, shorting is determined irrespective of motor load.

*a<sup>2</sup>*

Please replace the paragraph beginning at page 3, line 12 as follows:

In another aspect, the determining means includes a temperature correction circuit for correcting any pre-stored reference current value or voltage value supplied from the power source during normal operation according to a circumferential temperature. Therefore, the determining means includes the temperature correction circuit for correcting the pre-stored current or voltage reference supplied from the power source during normal operation. According to another aspect, the stop control means stops power supply for the motor when the determining means determines that one of the coils has shorted.

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[Please replace the paragraph beginning at page 3, line 23 as follows:]

In another aspect, an abnormality informing means is provided for informing a user of motor abnormality when the coil shorting is determined by the determining means. Therefore, the abnormality informing means informs a user of motor abnormality when it is determined by the determining means that at least one of the coils has shorted. A stop control means for stopping power supply for the motor when the coil shorting is determined by the determining means is provided.

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Please replace the paragraph beginning at page 5, line 26 as follows:

Detection signals from the current sensor 13, based on values of current supplied to the motor 1 (anode brush 5a) by the driving circuit 11, are input to controller 14. The controller 14 determines whether or not any of the coils 3a - 3l has shorted based on the input detection signals.

[Please replace the paragraph beginning at page 6, line 4 as follows:]

Here, FIG. 3A shows variations (ripple) of the current supplied to the motor 1 when the motor 1 rotates when all of the coils 3a - 3l are normal (the coils 3a - 3l are not shorted). In the same drawing, an average current variation (in the present embodiment, an average variation of a ripple which is a minimum current value out of a max current value per unit rotation) is

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*and*

indicated by "I1". On the other hand, FIG. 3B shows the variations of the current when the motor 1 rotates when at least one of the coils 3a - 3l is shorted. In the same drawing, the average current variation is indicated by "I2" which is larger than "I1". The reason is that current routes are changed between the original case (normal case) and when at least one of the coils 3a - 3l is shorted.

Please replace the paragraph beginning at page 7, line 5 as follows:

*a4*

When the average current variation supplied to the motor 1 becomes less than a lower limit determination value, set slightly less than the first reference value "I1", motor 1 is determined to be under a rotation constraint condition due to its load. FIG. 4A shows a current value during the motor rotation constraint due to its load in the normal case (when coils 3a - 3l are not shorted). In the same drawing, the current value is indicated by "I3". On the other hand, FIG. 4B shows a current value during the motor rotation constraint due to its load during shorting of at least one of the coils 3a - 3l. In the same drawing, the current value is indicated by "I4" which smaller than normal. The reason is also that current routes are changed between the original case (normal case) and when at least one of the coils 3a - 3l is shorted.

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[Please replace the paragraph beginning at page 7, line 19 as follows.]

In the controller, the current value "I3" during a normal state is stored as a second reference value. When current variation is lower than the lower limit value and becomes less than a determination value, set slightly less than a second reference value "I3", at least one of the coils 3a - 3l is determined to be shorted. The stored second reference value "I3" is corrected according to a circumferential temperature by the temperature correction circuit 14a provided in the controller 14, thereby reducing adverse effects for determination due to the circumferential temperature variations. When the controller 14 determines that at least one of the coils 3a - 3l is shorted in this manner, the controller 14 stops power supply to motor 1 from driving circuit 11, and turns on a warning lamp 15.

[Please replace the paragraph beginning at page 8, line 6 as follows.]

(1) The current sensor 13 detects the value of the current supplied to the motor 1 from the power source, and the controller 14 determines a short of at least one of the coils 3a - 3l by comparing the detection result from the current sensor 13 and the pre-stored current value supplied from the power source.

Please replace the paragraph beginning at page 8, line 22 as follows:

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(4) In the present embodiment, the warning lamp 15, which informs a user that the motor 1 is malfunctioning when the

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cmclw* controller 14 determines that at least one of the coils 3a - 3l has shorted, is provided.

Please replace the paragraph beginning at page 9, line 24 as follows:

*a1* In the above embodiment, when the controller 14 determines that the at least one of the coils 3a - 3l has shorted, the controller 14 stops power supply for the motor 1. However, the controller 14 does not need to stop power supply. In the above embodiment, the warning lamp 15, which informs a user of motor 1 malfunction when one of the coils 3a - 3l is shorting, is provided. However, sounds from a buzzer or the like other than the lamp 15 can be used.

### IN THE CLAIMS

Please cancel claim 7 without prejudice.

Please amend the claims as follows.

*a8* 1. (Amended) A motor coil-shorting detecting unit, comprising:

a motor including a rotor having a wire with a plurality of coils wrapped around said rotor;

a commutator provided on the rotor;